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Difference in risk perception of onboard security threats by aircrew and aviation security experts

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ABSTRACT

Airlines are increasingly relying on non-security personnel such as cabin crews and pilots to perform a security function when dealing with potential onboard security threats. The training aircrews receive on security threat assessment is considered by many to be inadequate. The way aircrews respond to potential onboard threats can have life and death consequences for passengers and other aircrew. How these potential threats are handled can also cause significant financial loss to the airlines through loss of productivity, passenger claims or even legal liability. For this reason, it is imperative we understand how aircrews perceive security risk in order to make appropriate risk assessments. This study examines if aircrew perceive security risks the same as aviation security experts. Five scenarios representing actual potential onboard security threats were given to a group of 67 pilots, cabin crew and aviation security experts. The participants were asked a series of questions about the scenarios that measured how they perceived the potential threat as well as other questions to determine how prepared they were to deal with each scenario. The results showed that aircrews perceive and assess risk associated with onboard security threats significantly different than aviation security experts.

1. Introduction

Onboard security threats have been a major concern for airlines and aviation security (AVSEC) professionals throughout the world. Despite the increase in security over the years, attacks against commercial aviation remains a top goal of terrorists. The international nature of air travel, the potential for mass casualties and the media spectacle an attack on aviation produces will continue to make commercial aviation an attractive target (Price and Forrest, 2016).

Even a minor security incident can consume valuable crew resources and increase crew workload exponentially at critical times during flight. Pilots, whose primary task is transporting passengers from one point to another safely (Fraher, 2004), must constantly maintain situational awareness whilst flying the aircraft and can become distracted as their workload increases (Wickens, 2002). Cabin crew (flight attendants) have also seen the tasks of safety and security conflict with passenger service demands (Damos et al., 2013). The need for pilots and cabin crew to understand their growing security role and for the aviation community to better equip aircrews to deal with onboard security threats is paramount in keeping commercial aviation the safest mode of transportation known to man.

Therefore, aircrew are dealing with security related events onboard aircraft more than ever. During the Covid-19 pandemic, aircrew have been put in the position to enforce new government mandated Covid-19 related policies. Investigations into passenger misconduct and assaults on aircrew in the United States have increased 463 percent (FAA) and 2021 alone has seen more reports of passenger misconduct events than the total amount of reports since the FAA began keeping records of such events in 1995 (ABC).

Aircrew are becoming increasingly concerned for their safety while dealing with these events. 85 percent of respondents in a 2021 survey of flight attendants in the United States reported dealing with an unruly passenger in 2021. One in five respondents reported being involved in a physical incident (AFA).

Understanding if aircrew assess these security events differently than security professionals is important for airline management in devising strategies to support their front-line employees and collectively respond to the uptick of security related incidents onboard aircraft. How airlines respond to these incidents is important when it comes to giving the aircrew the tools they need to safely carry out the enforcement of security rules and preventing future onboard security incidents. It is also important from a customer service perspective to ensure aircrew are

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correctly identifying and mitigating potential passenger misconduct issue before they escalate into an event that impacts customer expectations such as delays and flight diversions.

The purpose of this study was to find out if there is a difference in risk perception between different kind of employees in the aviation industry. For that a new scenario-oriented structured survey method was developed to test these hypotheses and examine risk perception among pilots, cabin crew, and aviation security experts.

2. Literature review

There are four major security threats facing commercial aviation today. The first is the intentional destruction of an aircraft such as from detonating an explosive onboard or shooting an aircraft down with a surface to air missile. The second type of threat comes in the form of an aircraft takeover or assault against the crew. The third threat relates to attacking soft targets such as a landside terminal or a hotel where aircrew are staying. The fourth type of threat would be a cyberattack on aviation infrastructure or air traffic control systems, resulting in disruptions or potentially causing an aircraft to crash (Oster et al., 2013). Several of these persistent threats come directly from inside the aircraft, in the working environment of pilots and cabin crew.

2.1. Aviation security

The Transportation Security Administration (TSA) publishes a list of 20 Layers of U.S. Aviation Security (Department of Homeland Security. (2017), 2017) that are meant to act as a defence against the four major security threats mentioned above. Fifteen of the twenty layers are security measures that are designed to prevent a threat from ever making it onboard the aircraft. There is no surprise then the majority of research into AVSEC focuses only on preventing threats from getting onboard. Topics such as risk-based security screening of passengers (McLay et al., 2006; McLay et al., 2010), physical passenger screening methods (Gkritza et al., 2006; Mitchener-Nissen et al., 2012), explosive detection (Singh and Singh, 2003) and baggage screening (Leone and Liu, 2005; Skorupski and Uchroński, 2015) comprise most of the literature.

Despite the fact there were failures at multiple levels of the AVSEC apparatus in the September 11, 2001 terrorist attacks in USA, there is little research that deals with terrorist and other security threats once they are onboard the aircraft. The research that does exist mostly relates to the United States Federal Air Marshal Service (FAMS) (Castelli et al., 2013; Jain et al., 2010; Stewart and Mueller, 2013), the United States Federal Flight Deck Officer (FFDO) Programme (Fraher, 2004; Nolly, 2011; Seidenstat, 2009; Stewart and Mueller, 2013; Winter et al., 2017) and hardened cockpit doors (Stewart and Mueller, 2013).

2.2. Aircrew security training

On most flights, dealing with onboard security threats has increasingly fallen upon pilots and cabin crew who traditionally do not have a security background. Aircrews are generally not trained as well as security experts and often lack the security knowledge and experience to deal with such threats (Wilber, 2007; Williams and Waltrip, 2017).

Under the regulations prescribed by the Aviation and Transportation Security Act (ATSA) in the United States, every airline was required to create a security programme that includes aircrew training on these eight elements (Table 1). It was the airlines, not the government who bore the financial burden of creating and implementing these security programmes. It was also left to the airlines' interpretation of the new legislation as to what content to include in the training as well as the length and the manner it would be taught to the aircrew. Because of the great latitude given to them by the ATSA in the development of training, the research shows the security training programmes were considered minimal by some aircrews (Williams and Waltrip, 2017).

After the airlines began training aircrews with these newly developed security programmes, the pilots and cabin crew "expressed their dismay and disdain for their new program" (Williams and Waltrip, 2017). Especially when it came to self-defense training for aircrew, some of the major flight attendant's unions protested the inadequate training and forced their airlines to reconsider their programme.

Table 1
Elements of Aircrew Training (ATSA).

1	Determination of the seriousness of any occurrence
2	Crew communication and coordination
3	Appropriate responses to defend oneself
4	Use of protective devices
5	Psychology of terrorists to cope with hijacker behavior and passenger response
6	Live situational training exercises regarding various threat conditions
7	Flight deck procedures or aircraft maneuvers to defend the aircraft
8	Any other subject matter deemed appropriate by the Administrator

2.3. Contradictions between safety and security

The aviation safety culture is designed to deal with internal issues such as technical or mechanical failures, human performance and the robustness of their own organisations. Characteristics of a good safety culture include reason and fairness. Aviation employees generally understand and accept safety rules because the rules seem logical to them. For the most part, aircrews consider the safety rules and policies reasonable as they are encouraged to learn from mistakes and are treated fairly for violations (Reason, 2016). In order to promote learning, aviation safety requires flexibility, trust and openness between management and workers (Pettersen and Bjørnskau, 2015).

The characteristics that produce such a good safety culture in the commercial aviation industry are often contradictory to security goals. Pettersen and Bjørnskau (2015) have shown there are organisational contradictions between safety and security in the aviation industry. Conflicting demands in organisations happen in many industries including aviation. These conflicts may have serious negative effects on an organisation (Pache and Santos, 2010).

Security is designed to combat mainly external and often unknown threats. Unlike safety policies that are usually designed to prevent a known issue from occurring, security policies are designed to prevent problems that are unknown and may never happen. Security functions are performed daily without any confirmation that they were effective. There are routine false alarms when it comes to security. In other parts of the transportation sector, this has increased the likelihood security procedures will not be followed all of the time (Tripathi et al., 2017). In contrast to safety rules, security regulations are rigid, enacted by an external agency and do not allow aircrew opportunity for input and feedback. Research has shown the contradictions between safety and security can hinder error discovery and problem-solving abilities of commercial airlines (Pettersen and Bjørnskau, 2015). There is no existing research that measures effectiveness of security policy in dealing with onboard security threats.

One of the most important factors that affect risk perception is trust (Jenkin, 2006). The institutional conflicts that exist when it comes to security in a safety-dominated field create a trust gap between aircrew and AVSEC experts. Several factors contribute to AVSEC experts lacking credibility with aircrew when it comes to security matters. When it comes to a terror attack or serious security breach, failures are more noticeable than successes, which may never be known to non-security personnel (Jenkin, 2006). There are also challenges with information sharing due to the conflicting institutional demands caused by the way safety and AVSEC are organised (Pettersen and Bjørnskau, 2015). Even though many airlines have their safety and security departments fall under a single chain of command and having the same goal of keeping passengers and crew safe, the cultural differences can be quite distinct causing friction and even isolation between the two sides. The safety side is seen as more open, and information sharing is encouraged to foster continuous learning that makes a good safety culture. On the other hand, the security side is not open to complete information sharing to protect operational security and to prevent their methods from being learned by potential bad actors. These factors could lead to pilots and cabin crews having a lack of trust in advice given to them by security experts, as they are not usually privy to all of the sensitive information the experts have.

Aircrew have shown frustration at the implementation of security rules, which increases the trust gap between them and AVSEC. Pilots question why they are subjected to searches when if they had criminal intent they could down the plane at any time during flight. They are prohibited from carrying sharp objects on board, but have access to a crash axe on the flight deck (Pettersen and Bjørnskau, 2015). Aircrew are prohibited from bringing a screwdriver on their flight when an aircraft technician can carry a full toolbox onboard without being searched (Williams and Waltrip, 2017). It is situations like these that make aircrew feel they are not trusted, and differentiates safety rules from security rules in that they do not always seem logical to them. Some aircrew perceive security rules to be illogical whilst there seems to be a consensus in the industry in regards to understanding safety rules.

The first two hypotheses that were tested were:

H1: Pilots and cabin crew are more likely to perceive a potential onboard security threat as an actual security threat than AVSEC experts.

H2: Pilots and cabin crew are more likely to believe a potential onboard security threat will cause injury or death than AVSEC experts.

2.4. Expert vs Common employee

Another important dynamic seemingly overlooked by most AVSEC research is the conflict between expert and common employees (non-experts or laypersons). Even amongst aircrews, there is a conflict between pilots and cabin crew as to roles when it comes to onboard security threats. According to the research conducted by Williams and Waltrip (2017), both pilots and cabin crew referred to themselves as the "last line of defense" when describing their role in dealing with an onboard security threat. They have found that both pilots and cabin crew downplay each other's importance in dealing with onboard threats. Cabin crew are generally the ones dealing with passenger security concerns and threats in the cabin, whilst pilots have the ultimate decision-making authority during any security incident. Pettersen and Bjørnskau (2015) discuss how functional roles in aviation can come into conflict when it relates to security. Pilots, cabin crew and aircraft technicians have power within their organisations due to their expertise in their positions. When it comes to security, they argue power is coercive in the form of the imposition of sanctions and not from their role in the aviation organisation.

Whilst aircrew can be considered common employees when it comes to security matters, they nevertheless have important security roles when there is an onboard threat. Neither pilots nor cabin crew are considered security experts, and common sentiment has been that there is a significant difference in risk perception between experts and laypersons. This is yet another dynamic that affects aircrews in their handling of onboard security threats. Experts are often perceived as being able to perform better than non-experts within their field of expertise (Thomson et al. 2004). In most cases the title of expert is given to one by consensus of their peers (Shanteau, 1992), although sometimes that label can be bestowed on someone for merely holding a position rather a measure of the actual knowledge they have on a particular topic (Rowe and Wright, 2001).

When these variances in perception of risk occur between experts and laypersons, it furthers the trust gap. In areas that the layperson has little knowledge such as sensitive security procedures, trust is even more important (Gerber and Neeley, 2005). There has been limited research conducted into how risk assessments differ between layperson and experts in other industries. Flynn et al. (1993) concluded experts and laypersons perceive radioactive waste risks very differently. Kraus et al. (1992) indicate there are significant differences in how toxicologists and the general public assess chemical risks. Lazo et al. (2000) show how laypersons perceive risks to ecosystems caused by climate change differently than scientists. Gutteling and Kuttschreuter (1999) also demonstrate how the general public perceived the threat from the Y2K or Millennium bug as more serious than computer experts.

The next set of hypotheses that were tested were:

H3: Pilots and cabin crew are more likely to believe a potential onboard security threat will cause damage to the aircraft or other property than AVSEC experts.

H4: AVSEC experts are more likely to perceive a potential onboard security threat as a false alarm than pilots and cabin crew.

2.5. Risk perception gap

Experts use an analytic system that is based on scientific rules, logic and probabilities to conduct formal risk assessments. Their risk assessments are usually based on objective statistical data. In AVSEC, tools such as threat matrices are used by experts to provide consistency when assessing risk. On the other hand, laypersons are more influenced by psychological factors (Hartmann et al., 2018) and use inferences and a more subjective approach (Slovic et al., 1981) when assessing risk.

Perceptions of risk are highly subjective and are determined by a variety of social constructs (Slovic, 1999). Each person's experiences, culture, demographics, political worldview and affiliations are just some of the things research has shown that have some influence on one's perception of risk. Even feelings of fear and comfort can widely vary based on a person's life experiences. For example, between 1999 and 2006 over 37,000 inmates in the United Kingdom turned down early release from prison because they perceived it to be less risky to stay in prison than being on the outside (Ross, 2013).

Instinctive and fast responses let humans know if something is safe or not and have allowed them to survive over thousands of years. These feelings are based on experience to emotion and affect (Slovic et al., 2004). Other psychological factors that have been shown to influence risk perception by laypersons is heuristics (Kahneman et al., 1982). When a judgment decision is made a person relies on an affect pool of experiential impressions mapped into their brain, which contain positive and negative associations. This mental shortcut is the affect heuristic (Slovic et al., 2004).

Emotions and feelings play an important role in aircrew forming risk perceptions especially when it comes to things like terrorism and onboard security threats that have a relatively low likelihood of occurring (Hassan and Salem, 2021). While these instinctive feelings used by aircrew to perceive risk are sometimes considered irrational by AVSEC experts, current research shows risk as a feeling should not be discounted and in some cases (especially when it comes to terrorism) can actually be more accurate than the analytical method (Slovic et al., 2004). Lack of trust can also lead to what experts consider irrational risk perceptions by laypersons (Sjöberg, 1999).

In aviation security, the perception of risk more so than actual dangers often drive aircrew and passenger demands for action (Jenkin, 2006; Renn, 1992). While the primary goal is to ensure the aircrew and passengers are safe, it should also be equally important that they feel safe (Jenkin, 2006). If passengers or even its employees have the perception that an airline is unsafe based on how a potential security threat was handled, it could cause substantial loss of business or productivity. AVSEC experts need to strike a balance between objective risk assessments and feelings and perceptions of their customers (Jenkin, 2006).

AVSEC experts who look at potential onboard security threats from an analytical mindset need also to consider these affect heuristics when advising aircrew. Understanding how these factors influence aircrew's risk perceptions is important to know how they will respond to onboard security threats (Paraschi et al., 2022). Addressing these concerns when giving advice about potential onboard threats will ensure better acceptance (Hartmann et al., 2018), build trust and work to resolve the conflicting demands that often exist between safety and security.

The final hypothesis tested was:

H5: Pilots consider loss of productivity or delays more than AVSEC experts when dealing with a potential onboard security threat.

2.6. Aims and objectives

As this literature review has shown, when it comes to aircrew dealing with onboard security threats, several important dynamics come into play (Boksberger et al., 2021). These dynamics have not been given sufficient attention in research, and this study aims to address that gap. Specifically, this study aims to answer through a set of hypotheses (Table 2) if pilots and cabin crew's (as non-experts in security) risk perceptions of onboard security threats differ from AVSEC experts by asking the following research question:

Do pilots and cabin crew's risk perceptions of onboard security threats differ from AVSEC experts?

In order to answer the research question we tested the five hypotheses listed earlier and given in Table 2..

3. Methods

This study required measuring how pilots and cabin crew assess risks when confronted by an onboard security threat. It also required comparing those risk assessments with that of AVSEC experts. Therefore, it was necessary to collect data from current commercial airline pilots and cabin crew and AVSEC personnel. To measure how they assessed security risk and handled onboard security threats in a practical and safe environment, five scenarios representing potential onboard security threats were developed to elicit responses from for the participants on their perceptions as well as how they would handle the potential threats.

3.1. Protocol

In this survey study, since the sample of professionals required for this study was small and specific, a convenience sample was chosen. There was also an element of a judgement approach (Marshall, 1996). Efforts were made to ensure that participants came from a wide range of geographical locations (North America, Europe, Middle East and Asia), which is different than most convenience samples where participants tend to come from the same geographical area (Emerson, 2015). The judgment approach also ensured a variety of different airlines was represented as well as a wide range of experience levels (Loffi et al., 2013). The sample of AVSEC experts were contacted through the social media platform LinkedIn based on their profiles as AVSEC experts. The pilots and cabin crews were contacted directly by the researcher through email.

3.2. Participants

A total of 89 participants that responded to the survey between June 26 and August 4, 2019. Twenty-two participants were either automatically disqualified from the study because they did not agree to one of the five questions regarding consent to participate, or they opened the survey and did not provide answers to any of the questions. At final count, 67 commercial aviation professionals participated in this study.

All of the pilots and cabin crew who participated were active employees of commercial airlines who were up to date with their certifications and training and assigned to regular flight duty. AVSEC experts either employed by a commercial airline, aviation regulatory body, or AVSEC consultancy in senior positions also participated. The sample included employees from 22 different airlines. The airlines represented major international carriers that operate short and long-haul flights, as well as regional airlines that operate short haul flights. All of the airlines were based in North America, Europe, Middle East or Asia (Table 3).

Table 2
Set of Hypotheses.

H1: *Pilots and cabin crew are more likely to perceive a potential onboard security threat as an actual security threat than AVSEC experts.*
H2: *Pilots and cabin crew are more likely to believe a potential onboard security threat will cause injury or death than AVSEC experts.*
H3: *Pilots and cabin crew are more likely to believe a potential onboard security threat will cause damage to the aircraft or other property than AVSEC experts.*
H4: *AVSEC experts are more likely to perceive a potential onboard security threat as a false alarm than pilots and cabin crew.*
H5: *Pilots consider loss of productivity or delays more than AVSEC experts when dealing with a potential onboard security threat.*

3.2.1. Pilots

Twenty-three commercial airline pilots participated in the study. The distribution of the type and region of airlines the pilots were employed by can be seen in Table 4. Since commercial pilots in the United States and European Union must be at least 18 years old and the mandatory retirement age is 65, all pilot participants fell within this range. They had an average age of 38.09 (SD = 15.383), with a median of 32, mode of 24 and a range of 22–63. Five broad ranges of experience were represented in this study (Table 5). 56 % of the pilots had less than 10 years experience in their role, whilst 43 % had more than 10 years experience in their role. Experience ranged from less than 1 year (one participant), 1 to 3 years (six participants), 3 to 5 years (five participants), 5 to 10 years (one participant) and more than 10 years (10 participants).

3.2.2. Commercial airline cabin crew

Twenty-two commercial airline cabin crew participated in the study. Like the pilots, they represented various regions and types of airlines (Table 6). They had an average age of 24.55 (SD = 3.203), with a median of 24.5, mode of 25 and a range of 20–31. The sample represented a relatively young range of experience (Table 7), with 50 % having 3 years or less of experience, whilst only 18 % had more than 5 years experience in their role. Experience ranged from 1 to 3 years (11 participants), 3 to 5 years (seven participants) and 5 to 10 years (four participants).

3.2.3. Aviation security experts

Twenty-two AVSEC experts participated in the study. The experts also represented various regions from around the world (Table 8). They had a higher average age than that of the aircrew at 49 (SD = 12.240), with a median of 48, mode of 31 and a range of 31–75. The sample also represented a range of experience that was higher than the aircrew (Table 9). This was expected due to their status as experts and the senior positions they hold. Only 9 % of the AVSEC experts had less than 5 years experience in their role, whilst 68 % had more than 10 years experience in their role. Experience ranged from 1 to 3 years (two participants), 5 to 10 years (five participants) and more than 10 years (15 participants).

3.2. Instrument

In order to gauge the responses of the participants to potential onboard security threats, a web-based survey was designed. The survey was distributed to the participants online, and no IP addresses were

Table 3
Airline Representations.

Region	Airlines Represented	Long-haul	Short-haul	Regional
Asia-Pacific	1	1	0	0
Europe	5	2	2	1
Middle East	3	2	1	0
North America	13	4	6	3
All	22	9	9	4

Table 4
Pilots Regions and Type of Airline.

Type	Participants
Europe	
Regional	1
Short Haul	3
North America	
Regional	10
Short Haul	1
Long Haul	8
All	23

Table 5
Pilots Years of Experience.

Years	Participants
Less than 1 year	1
1–3 years	6
3–5 years	5
5–10 years	1
More than 10 years	10
All	23

Table 6
Cabin Crew Regions and Type.

Type	Participants
Asia-Pacific	
Long Haul	1
Europe	
Regional	2
Short Haul	1
Long Haul	3
Middle East	
Long Haul	1
North America	
Regional	2
Short Haul	7
Long Haul	5
All	22

Table 7
Cabin Crew Years of Experience.

Years	Participants
Less than 1 year	–
1–3 years	11
3–5 years	7
5–10 years	4
More than 10 years	–
All	22

Table 8
AVSEC Experts Regions.

Region	Participants
Asia-Pacific	2
Europe	8
Middle East	5
North America	7
All	22

Table 9
AVSEC Experts Years of Experience.

Years	Participants
Less than 1 year	–
1–3 years	2
3–5 years	0
5–10 years	5
More than 10 years	15
All	22

Table 10
Scenarios.

Scenario	Information provided
1 (passenger reports alleged suspicious behaviour)	During flight, a passenger informs a member of cabin crew that she had overheard two passengers seated behind her discussing whether a bomb was aboard the aircraft.
2 (alleged disorderly passenger)	During flight, a group of rugby players appear to have been drinking too much. As the cabin crew is speaking to them attempts to calm them down, one of the players runs the length of the cabin and head butts a member of cabin crew.
3 (crew reports alleged suspicious circumstance)	During flight, a member of the cabin crew was conducting a toilet check and discovered the word "bomb" written in pen on an internal cupboard door.
4 (alleged suspicious circumstance during pre-flight)	A pilot entered the flight deck to take over the aircraft in preparation for its next flight. The pilot found a laminated piece of paper with a crayon drawing of an aircraft appearing to fall from the sky. On the reverse of the paper the words "Have a nice flight" were written in crayon.
5 (passengers report alleged suspicious person)	A man boards the flight wearing a baseball hat with a religious message written on it. The man has a Middle Eastern appearance. Several passengers advise the cabin crew they are uncomfortable about flying with this man on the aircraft.

recorded to ensure anonymity and to ensure participants would be free to discuss the sensitive topic covered in this study.

First, five brief scenarios were created to present the participants with potential onboard threats (Table 10). A series of semi-structured informal conversational interviews (Gall and Gall, 2003) were conducted with highly experienced AVSEC experts who held senior positions in commercial airline security departments and had over 10 years of experience. The initial purposes of the interviews were to identify potential problems and topics for study within the commercial AVSEC sector and form a research question. The subsequent conversation with one AVSEC expert was used to create the scenarios used in this study. To ensure the scenarios had validity, all five scenarios were based on actual onboard incidents that recently occurred at a major commercial airline and represented relevant potential threats (Bolger and Wright 1994) that were of interest to this study.

The five scenarios were specifically designed to require the participants to conduct risk assessments of potential onboard security threats. Scenarios that required little risk assessment and would elicit a definitive response regardless who the participant was such as a breach of the flight deck door or an actual bomb detonation onboard were not used. Each scenario was also designed to have the participants think of different security considerations that would commonly be encountered on any commercial airline.

Each scenario was followed by an identical set of questions. To ensure validity, the set of questions was also developed based on the information obtained from the informal conversational interviews with an AVSEC expert. Each question represented one of the hypotheses being explored in this study. Each set of questions contained 14 Likert-type questions using a five-point scale where the value of 1 anchored the low end of the scale and the value of 5 anchored the high end. One open-ended question asked what actions the participant would take during that scenario.

Likert-type surveys have been used in several previous studies that aimed to measure responses of aviation professionals on other topics (Thomson et al. 2004; Strohmeier et al., 2018; Sieberichs and Kluge, 2018; Arcúrio et al., 2018). The five-point scale was chosen for this study as research suggests five to seven points are ideal (McKelvie 1978; Hinkin 1998), and at least four points are needed to test the homogeneity of items within each latent construct (Harvey et al., 1985). To measure cognitive categories a 5-point scale is considered optimal (Krosnick and Fabrigar 1997). It is difficult to improve on internal consistency reliability when using scales larger than 5-point (Hinkin and Schriesheim 1989, Schriesheim and Hinkin 1990) and using too many scale points becomes detrimental as it can reduce clarity of meaning of the response options (Krosnick and Fabrigar 1997). The response anchors chosen for each 5-point scale were based on existing research by Vagais (2006).

The open question was the final question in each set. This allowed participants to have more time to think about the scenario based on the previous 14 questions. This question also allowed participants to provide additional information about how they would handle each scenario that could not be elicited in the Likert-type responses.

3.4. Ethical considerations

This study met the requirements of University College London Department of Security and Crime Science Ethics Committee. Participants gave informed consent before being allowed to proceed to the survey. They were told that they could withdraw from the study at any time without answering all of the questions and were not required to answer any questions they felt uncomfortable with. Data was de-identified to preserve anonymity of the participants. They were assured that the data was completely anonymous, confidential. Participants were told not to disclose any SSI in their answers.

3.5. Data coding and analysis

Sixty-seven respondents provided 5,628 pieces of data that was analysed using various statistical methods with the results in the next section.

4. Results

4.1. Descriptive statistics

The Means of AVSEC experts and aircrew's responses to the questions in the survey that addressed likelihood of the threat, injury to passengers or crew and damage to aircraft or other property are presented in Table 11. The shaded results represent those that represent statistically significant differences (*p less than 0.05*). This table highlights the results that directly relate to the research question and show confirmation of the differences in assessing security risk by aircrew and AVSEC experts in 13 of the 15 questions and all of the risk assessment questions in four out of five scenarios.

Descriptive statistics are presented that show the mean of the results of each of the three participant groups (pilot, cabin crew and AVSEC experts) for each question in all five scenarios (Table 12).

4.2. Hypotheses results

H1: For scenarios one, two, three and four, a Kruskal-Wallis H test showed that there was a statistically significant difference in the perceived likelihood of threat between AVSEC experts and aircrew. There was no statistically significant difference for scenario five. The shaded results indicate those that represent statistically significant differences (Table 13).

H2: For scenarios one, two, three and four, a Kruskal-Wallis H test showed that there was a statistically significant difference in the perceived likelihood of injury to passengers and crew between AVSEC experts and aircrew. There was no statistically significant difference for scenario five. The shaded results indicate those that represent statistically significant differences (Table 14).

Table 11
AVSEC and Aircrew Risk Assessment Mean (Std. Deviation) Scale 1–5.

Question	AVSEC	Aircrew	Question	AVSEC	Aircrew
S1 Likelihood of Threat	2.32 (1.249)	3.58 (1.055)	S4 Likelihood of Injury	1.81 (0.873)	2.75 (1.235)
S2 Likelihood of Threat	3.00 (1.024)	4.07 (1.087)	S5 Likelihood of Injury	1.29 (0.463)	1.44 (0.598)
S3 Likelihood of Threat	2.14 (1.356)	3.37 (1.220)	S1 Likelihood of Damage	1.82 (0.907)	3.51 (1.199)
S4 Likelihood of Threat	2.19 (1.209)	2.80 (1.114)	S2 Likelihood of Damage	2.41 (1.221)	3.07 (1.142)
S5 Likelihood of Threat	1.43 (0.978)	1.62 (0.747)	S3 Likelihood of Damage	1.77 (1.152)	3.27 (1.205)
S1 Likelihood of Injury	1.82 (0.907)	3.47 (1.179)	S4 Likelihood of Damage	1.86 (0.854)	2.85 (1.272)
S2 Likelihood of Injury	3.05 (1.214)	4.14 (0.852)	S5 Likelihood of Damage	1.24 (0.436)	1.44 (0.598)
S3 Likelihood of Injury	1.82 (1.1818)	3.34 (1.237)			

H3: For scenarios one, two, three and four, a Kruskal-Wallis H test showed that there was a statistically significant difference in the perceived likelihood of damage to aircraft or other property between AVSEC experts and aircrew. There was no statistically significant difference for scenario five. The shaded results indicate those that represent statistically significant differences (Table 15).

H4: For scenarios one, three and four, a Kruskal-Wallis H test showed that there was a statistically significant difference in the extent AVSEC experts consider the incident to be a false alarm than aircrew. There were no statistically significant differences for scenarios two and five. The shaded results indicate those that represent statistically significant differences (Table 16).

H5: For all five scenarios, a Kruskal-Wallis H test showed that there was a statistically significant difference in the perceived possibility of delays on operations between pilots and AVSEC experts. The shaded results indicate those that represent statistically significant differences (Table 17).

Figs. 1, 2 and 3 are radar charts that illustrate the difference in the perceived impact of on-board security threats for pilots, cabin crew and aviation security experts who participated in this study. The Cronbach Alpha values for the survey responses from the pilots, cabin crew and aviation security experts were 0.7, 0.65 and 0.77, respectively. These numbers have to be interpreted in light of the fact that the constructs of physical harm to the passengers, damage to the aircraft, false alarm and impact on operations may be considered heterogenous. Bearing that in mind the Cronbach's Alpha values may be considered sufficiently acceptable (Tavakol and Dennick, 2011).

5. Discussion

The main aim of the study was to determine if aircrew assess risk differently than AVSEC experts when dealing with a potential onboard threat in five different scenarios. As suspected, the empirical results do suggest that aircrew perceive threats differently than AVSEC experts. The three questions in each scenario that most directly deal with risk perception (likelihood the incident represents an actual security threat, likelihood the incident causes severe injury or death to passengers or

Table 12
Perceptions of Pilots, Cabin Crew and AVSEC Experts Mean (Std. Deviation) Scale 1–5.

		Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5
What is the likelihood this incident represents an actual security threat?	Pilot	3.65 (0.885)	4.09 (0.921)	3.00 (1.225)	2.40 (0.940)	1.65 (0.745)
	C.C.	3.50 (1.225)	4.05 (1.253)	3.75 (1.118)	3.20 (1.152)	1.58 (0.769)
	AVSEC	2.32 (1.249)	3.00 (1.024)	2.14 (1.356)	2.19 (1.209)	1.43 (0.978)
What is the likelihood this incident causes severe injury or death to passengers or crew?	Pilot	3.22 (0.998)	4.18 (0.795)	2.86 (1.062)	2.20 (0.894)	1.55 (0.686)
	C.C.	3.73 (1.316)	4.09 (0.921)	3.85 (1.226)	3.30 (1.302)	1.32 (0.478)
	AVSEC	1.82 (0.907)	3.05 (1.214)	1.82 (1.181)	1.81 (0.873)	1.29 (0.463)
What is the likelihood this incident causes severe damage to the aircraft or other property?	Pilot	3.22 (0.998)	3.18 (1.220)	2.81 (1.078)	2.25 (0.851)	1.50 (0.688)
	C.C.	3.82 (1.332)	2.95 (1.071)	3.75 (1.164)	3.45 (1.356)	1.37 (0.496)
	AVSEC	1.82 (0.907)	2.41 (1.221)	1.77 (1.152)	1.86 (0.854)	1.24 (0.436)
To what extent would you consider the incident to be a false alarm or a non-incident?	Pilot	2.87 (1.217)	1.27 (0.456)	3.05 (1.203)	3.35 (1.268)	4.05 (0.826)
	C.C.	2.00 (1.140)	1.50 (0.673)	1.90 (1.210)	2.50 (1.433)	3.21 (1.398)
	AVSEC	3.64 (1.177)	1.73 (1.077)	3.55 (1.335)	3.70 (1.031)	3.90 (1.261)
To what extent would the possibility of loss of productivity or delays if you would take action influence the decision you would make in this incident?	Pilot	1.52 (0.846)	1.27 (0.631)	1.62 (1.161)	1.35 (0.587)	1.25 (0.550)
	C.C.	2.36 (1.590)	2.05 (1.397)	2.15 (1.565)	2.05 (1.504)	1.95 (1.224)
	AVSEC	2.62 (1.244)	2.19 (1.365)	2.38 (1.244)	2.35 (1.137)	2.35 (1.137)

Table 13
Likelihood of Threat.

	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 5	
	AVSEC	Aircrew	AVSEC	Aircrew	AVSEC	Aircrew	AVSEC	Aircrew	AVSEC	Aircrew
Extremely Unlikely	31.8 %	2.2 %	4.5 %	4.5 %	50 %	7.3 %	33.3 %	7.5 %	76.2 %	53.8 %
Unlikely	31.8 %	13.3 %	31.8 %	4.5 %	13.6 %	19.5 %	33.3 %	40 %	14.3 %	30.8 %
Neutral	13.6 %	31.1 %	27.3 %	13.6 %	13.6 %	22 %	23.8 %	27.5 %	4.8 %	15.4 %
Likely	18.2 %	31.1 %	31.8 %	34.1 %	18.2 %	31.7 %	–	15 %	–	–
Extremely Likely	4.5 %	22.2 %	4.5 %	43.2 %	4.5 %	19.5 %	9.5 %	10 %	4.8 %	–
Mean Rank	21.75	39.99	21.55	39.48	21.82	37.46	24.62	34.35	26.43	32.69
Kruskal-Wallis H(df)Asymp. Sig.	13.613 (1) *p* =.000		13.810 (1) *p* =.000		10.928 (1) *p* =.001		4.486 (1) *p* =.034		2.346 (1) *p* =.126	

Table 14
Likelihood of Injury.

	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 5	
	AVSEC	Aircrew	AVSEC	Aircrew	AVSEC	Aircrew	AVSEC	Aircrew	AVSEC	Aircrew
Extremely Unlikely	45.5 %	4.4 %	9.1 %	–	59.1 %	7.3 %	47.6 %	15 %	71.4 %	61.5 %
Unlikely	31.8 %	17.8 %	31.8 %	6.8 %	13.6 %	19.5 %	23.8 %	32.5 %	28.6 %	33.3 %
Neutral	18.2 %	28.9 %	13.6 %	9.1 %	18.2 %	26.8 %	28.6 %	27.5 %	–	5.1 %
Likely	4.5 %	24.4 %	36.4 %	47.7 %	4.5 %	24.4 %	–	12.5 %	–	–
Extremely Likely	–	24.4 %	9.1 %	36.4 %	4.5 %	22 %	–	12.5 %	–	–
Mean Rank	18.16	41.74	22.30	39.10	19.23	38.85	22.40	35.51	28.29	31.69
Kruskal-Wallis H(df)Asymp. Sig.	22.628 (1) *p* =.000		12.627 (1) *p* =.000		17.174 (1) *p* =.000		8.039 (1) *p* =.005		0.749 (1) *p* =.387	

Table 15
Likelihood of Damage.

	Scenario 1		Scenario 2		Scenario 3		Scenario 4		Scenario 5	
	AVSEC	Aircrew	AVSEC	Aircrew	AVSEC	Aircrew	AVSEC	Aircrew	AVSEC	Aircrew
Extremely Unlikely	45.5 %	4.4 %	22.7 %	4.7 %	59.1 %	4.9 %	42.9 %	12.5 %	76.2 %	61.5 %
Unlikely	31.8 %	17.8 %	45.5 %	30.2 %	18.2 %	26.8 %	28.6 %	35 %	23.8 %	33.3 %
Neutral	18.2 %	26.7 %	4.5 %	34.9 %	13.6 %	24.4 %	28.6 %	22.5 %	–	5.1 %
Likely	4.5 %	24.4 %	22.7 %	14 %	4.5 %	24.4 %	–	15 %	–	–
Extremely Likely	–	26.7 %	4.5 %	16.3 %	4.5 %	19.5 %	–	15 %	–	–
Mean Rank	18.02	41.81	25.91	36.63	18.86	39.05	22.21	35.61	27.40	32.17
Kruskal-Wallis H(df)Asymp. Sig.	22.986 (1) *p* =.000		5.013 (1) *p* =.025		18.156 (1) *p* =.000		8.378 (1) *p* =.004		1.499 (1) *p* =.221	

crew and likelihood the incident would cause severe damage to aircraft or other property) showed that there was a statistically significant difference in perception between aircrew and AVSEC experts.

In all five scenarios, AVSEC experts reported the likelihood of threat, likelihood of injury and likelihood of damage was much lower than both the pilot and cabin crew groups. All three groups were in agreement

Table 16
Extent False Alarms.

	Scenario 1 AVSEC	Aircrew	Scenario 2 AVSEC	Aircrew	Scenario 3 AVSEC	Aircrew	Scenario 4 AVSEC	Aircrew	Scenario 5 AVSEC	Aircrew
Never	9.1 %	34.1 %	59.1 %	65.9 %	13.6 %	36.6 %	5 %	22.5 %	9.5 %	10.3 %
Rarely	9.1 %	15.9 %	18.2 %	29.5 %	9.1 %	14.6 %	10 %	20 %	4.8 %	5.1 %
Sometimes	9.1 %	20.5 %	18.2 %	4.5 %	9.1 %	12.2 %	10 %	12.5 %	9.5 %	17.9 %
Often	54.5 %	29.5 %	–	–	45.5 %	36.6 %	60 %	32.5 %	38.1 %	43.6 %
Always	18.2 %	–	4.5 %	–	22.7 %	–	15 %	12.5 %	38.1 %	23.1 %
Mean Rank	44.73	27.89	36.34	32.08	40.84	27.26	36.70	27.40	33.67	28.79
Kruskal-Wallis H(df)Asymp. Sig.	12.251 (1) p =.000		0.997 (1) p =.318		8.637 (1) p =.003		4.134 (1) p =.042		1.179 (1) p =.277	

Table 17
Influence of Possibility of Delays.

	Scenario 1 AVSEC	Pilots	Scenario 2 AVSEC	Pilots	Scenario 3 AVSEC	Pilots	Scenario 4 AVSEC	Pilots	Scenario 5 AVSEC	Pilots
Not At All Influential	23.8 %	65.2 %	47.6 %	81.8 %	28.6 %	71.4 %	30 %	70 %	30 %	80 %
Slightly Influential	23.8 %	21.7 %	14.3 %	9.1 %	33.3 %	9.5 %	25 %	25 %	25 %	15 %
Somewhat Influential	23.8 %	8.7 %	14.3 %	9.1 %	14.3 %	9.5 %	25 %	5 %	25 %	5 %
Very Influential	23.8 %	4.3 %	19 %	–	19 %	4.8 %	20 %	–	20 %	–
Extremely Influential	4.8 %	–	4.8 %	–	4.8 %	4.8 %	–	–	–	–
Mean Rank	28.40	17.11	26.24	17.95	25.74	17.26	25.60	15.40	26.15	14.85
Kruskal-Wallis H(df)Asymp. Sig.	9.557 (1) p =.002		6.491 (1) p =.011		5.814 (1) p =.016		8.898 (1) p =.003		11.370 (1) p =.001	

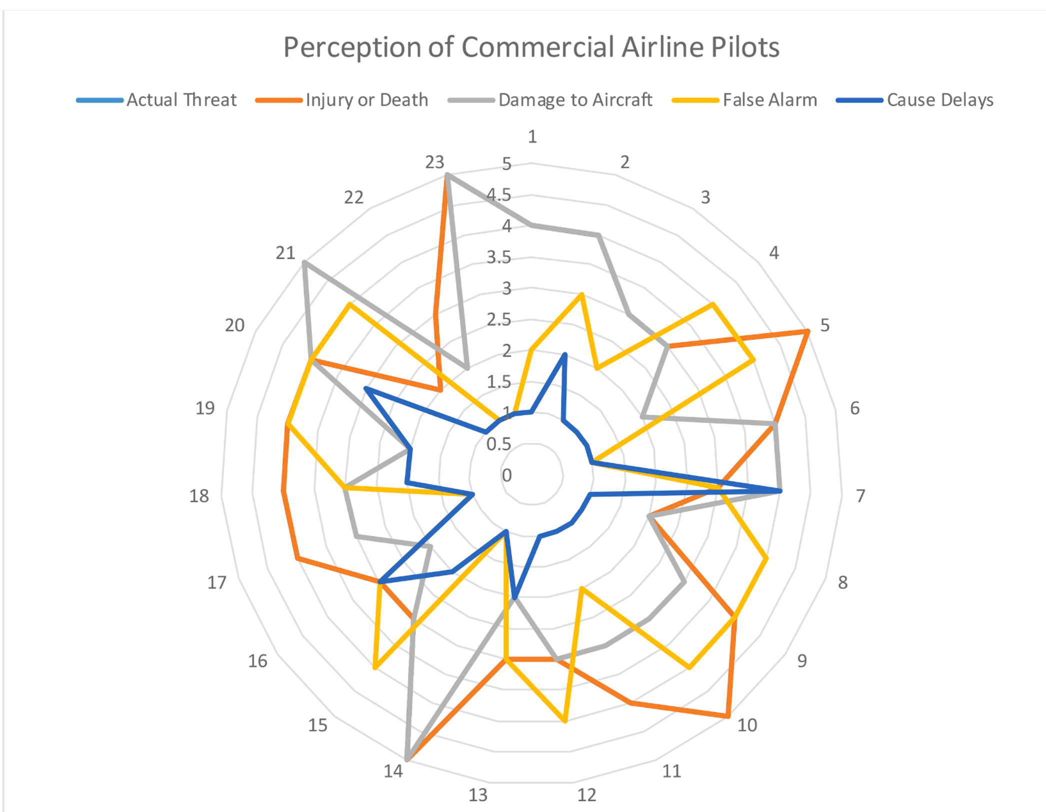

Fig. 1. Radar chart of how commercial airline pilots perceive the impact of on-board security threats.

about scenario five though, which had to do with a passenger feeling uncomfortable about another passenger's appearance, that it had the least likelihood of being an actual threat, causing injury or death or injury or causing severe damage.

When examining the question that asked if the participants considered the incident to be a false alarm, again the AVSEC experts indicated they would consider the incident to be a false alarm more so than cabin crew in all five scenarios and more than pilots in all scenarios except scenario five. All three groups considered a false alarm in scenario five the most likely outcome. Cabin crews considered each scenario to be false the least with the exception of scenario two, which could be expected as it related to a disorderly passenger assaulting a member of cabin crew.

These findings suggest the risk perception gap between experts and

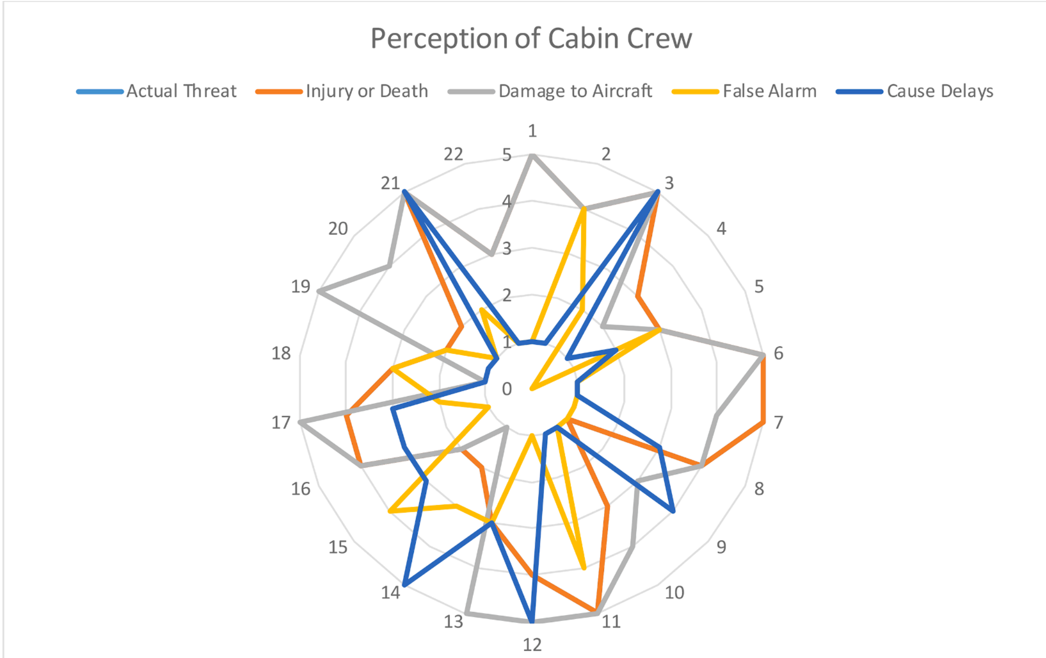

Fig. 2. Radar chart of how commercial cabin crew perceive the impact of on-board security threats.

Fig. 3. Radar chart of how aviation security experts perceive the impact of on-board security threats.

non-experts (Sjöberg, 2001; Slovic, 1987) observed in other fields such as nuclear radiation (Perko, 2014), public transport (Rundmo and Moen, 2006) and role of new technology (Digmayer and Jakobs, 2016) continue to be present in aviation. Aircrew, as non-experts in security, perceived security risk much greater than the AVSEC experts. Some of the pilot participants said they would divert the flight for all of the scenarios that occurred during flight. Twenty-one pilots said they would likely divert the aircraft in at least one of the scenarios. Some of those pilots did indicate their company policy would require diversion for scenario two, which was an actual assault of a crewmember. None the less, several pilots would take the extreme measure of diversion in the other scenarios. Tables 18 and 19 list some of the responses from the pilots, cabin crew and aviation security experts to the open-ended question in the survey on how they assess risk from various scenarios.

A surprising result of the study was that pilots were significantly less influenced by the possibility of delays than either cabin crew or AVSEC experts when dealing with a potential onboard threat. This could be attributed to the pilots' training. There have been several high-profile

Table 18
Pilot & Cabin Crew Responses.

Scenario 1:
"Divert, better safe than sorry"
"Immediately divert"
"When it comes to bombs, there is no false alarm to take a chance, I'll declare an emergency (divert)".
"we would treat all threats with the same amount of caution regardless if they are legitimate or not".
Scenerio 3:
"The flight would be diverted and federal officials would be called to investigate"
"Call company, divert".

Table 19
AVSEC Responses.

Scenario 1:
"ensure the assessor has full facts as opposed to hearsay"
"verify"
"gather more information"
"use threat assessment guidelines"
Scenario 3:
"Assess in accordance with threat assessment methodology"
"This type of incident is almost certainly a non-event"
"Suicide bombers don't announce the action. Others seek attention and wish to disturb".

aviation accidents where a human factors phenomenon known by pilots as "Get-There-Itis" has played a role. This is when a pilot's judgment is impaired through a fixation on the original goal or destination, combined with a disregard for any alternative course of action (Velazquez, 2018). Because of this, all pilots have been trained to overcome "Get-There-Itis" for safety reasons. This conditioning could also be carried over to dealing with an onboard security incident.

When it comes to the influence of passenger demands, only scenario five showed a significant difference between aircrew and AVSEC experts. Again it was surprising, aircrew would be less influenced by passenger demands in scenario five than AVSEC experts even though the scenario had to do with passengers feeling uncomfortable about another passenger. In all five scenarios cabin crews was found be influenced by passenger demands more than pilots, which was expected, as they are the group that deals most directly with the passengers. All groups also indicated that out of the five scenarios, they would be most influenced by passenger demands in scenario one, which dealt with the passenger that overheard another passenger speaking of a bomb.

Also, in all five scenarios, AVSEC experts believed their company SOP would influence the handling of the incident more so than pilots. This is not to say pilots were not cognizant of the SOP's when dealing with the scenarios. In fact, thirteen pilots referenced "SOP's" when describing how they would handle the scenarios.

The fact that pilots indicated they were less influenced by their SOP's than the AVSEC experts is an interesting finding as it could indicate several things. Pilots either do not trust or completely understand security SOP's, as suggested by past research showing the conflict between safety and security in aviation (Pettersen and Bjørnskau, 2015), or pilots do not believe security SOP's cover all of the scenarios put forth in this study. In either case, this could be indicative of the need for airlines to revise their security SOP's with the factors we have explored that influence risk perceptions of the aircrews.

5.1. Limitations

The primary limitation of this study has to do with small sample size. Studies with small sample sizes are not uncommon when dealing with a population of specialists. Other studies that also had a relatively small sample size measured risk perception of groups of 36 and 28 pilots (Thomson et al. 2004) and conducted qualitative inquiries of ten AVSEC experts (Loffi et al., 2013).

There were several challenges that made it difficult to obtain data from a larger number of participants in this study. The aviation community as a whole tends to be a highly guarded community (Strohmeier et al., 2018), especially when discussing security procedures. All of the aircrew that declined to participate in the study mentioned not wanting to discuss security issues or concern for inadvertently disclosing sensitive security information (SSI) even though they were assured no SSI would be elicited or divulged in this study.

When it came to AVSEC experts, the challenges were even greater. Generally, an expert is considered a professional that has gained experience through ten years or more of practice in their field (Ericsson et al., 1993). AVSEC experts represent a very specialized niche segment in the larger security industry. Since the Air Transport System is part of a nation's critical infrastructure, governments have strong regulatory control over the AVSEC sector and restrict who has access to current AVSEC threats and information. This creates a relatively small knowledge base to obtain data from. When it comes to dealing with onboard threats, that knowledge base becomes even smaller as the largest segment of the AVSEC industry is involved with security functions related to passengers, baggage and cargo screening before they ever get onboard the aircraft.

Another difficulty has to do with the sensitive nature of their work. Much of what AVSEC experts deal with on a daily basis contains SSI. There is a cultural reluctance in the security profession to be open; for fear that SSI will find its way into the wrong hands (Helmick, 2008). Like aircrew, several AVSEC experts cited SSI as the reason they did not want to participate.

Fifty-two AVSEC experts were contacted for this study. Their response rate was 42 % in contrast to the 79 % response rate for aircrew in this study. Due to the inherent difficulties in obtaining information from AVSEC experts, the sample size was smaller than that of the aircrew. Despite the sample size being smaller than that of aircrew, many experts that did participate in this study represented director level or higher positions within commercial airline's security departments or AVSEC regulatory bodies. They had significant experience in the commercial AVSEC industry in decision-making and holding strategic oversight on complicated issues of policy making and day-to-day operational response to the type of onboard security incidents this study was concerned with.

A future study with a larger sample size will allow for advanced econometric analysis of how the perception varies among different socio-demographic groups of airline employees and their gender, and the role played by factors such as age, years of experience etc.

Another limitation of this study deals with obtaining data from Likert-type responses. Even when using a non-parametric statistical test like the Kruskal-Wallis H test, one cannot avoid the fact that the individual participants will interpret the same response choices differently (Camparo and Camparo, 2013). For instance, one participant may consider the response "slightly influential" to mean barely any, where another participant believes it to mean some but not a lot. Although any study that uses Likert or Likert-type responses has to consider this limitation, it is still considered one of the most effective methods for measuring perceptions in the aviation industry (Strohmeier et al., 2018; Thomson et al. 2004; Sieberichs and Kluge, 2018; Arcúrio et al., 2018).

5.2. Implications for the aviation industry

The research suggests aircrew assess security events differently than security professionals. This is important for airline security professionals to be aware of when devising strategies to identify security risks and put in place controls or mitigation plans to decrease the impact of security and passenger misconduct events onboard aircraft and in airports. The aircrew does not have the luxury of having the airline security expert onboard to deal with a potential security event. Most of the time, it is not practical to even consult with the airline security team when events are quickly unfolding in the air. This makes bridging the gap in how aircrew perceive security events and formulate their assessments even more important.

Airline security professionals should not assume aircrew will see events through the same lens so to speak. They must be willing to listen empathetically to reports from aircrew about security incidents and understand perceptions may be different. Communication strategies need to be devised to communicate how the airline is responding to these security events to ensure the aircrews feel supported by the security department and also to foster trust in their assessments and recommendations. Security professionals also need to communicate to the aircrew what they need to “help them help you”. Some of these things may seem second nature to the security professional, but may be unfamiliar territory for aircrew, for example what steps needed to be taken if the aircrew become a victim of an assault to aid in prosecution of the passenger. Furthermore, training programs that explore bias and perception as well as security risk management should be given to aircrew by the airline’s security team to raise awareness of this issue and open communication channels up between the two groups.

Whilst it’s clear that the aircrew and specifically the captains have the ultimate responsibility for their flight’s safety, AVSEC experts are employed by airlines to ensure the overall safety of the passengers, aircraft and other company assets. Arguably, the most important asset and the primary “customers” of an airline’s AVSEC department are the aircrew that rely on their security advice when dealing with an onboard security incident. To effectively serve these customers, AVSEC experts and aircrew must continue to work together to understand each other’s roles and responsibilities and close the risk perception gap. In commercial aviation, barriers have been erected by organisational conflicts and distrust of the security system by aircrew is prevalent and helps to create this gap.

Primarily, AVSEC experts should be aware that this risk perception gap exists between aircrews and themselves. They must understand the unique factors found in aviation that contribute to this gap. In a culture that is highly safety focused, sometimes security rules are not understood. Institutional conflicts such as the secretive nature of security operations also play a factor. Risk perception is also affected by differences in roles and the expert versus common employee dynamic. Social constructs such as affect heuristic, feelings, cultural factors and the media must also be considered by AVSEC experts when dealing with their customers.

Next, effective risk and security communication must be a cornerstone of this strategy. Airlines should be encouraging aircrew to consult AVSEC experts more frequently when dealing with a potential security incident in order to make more informed decisions using their specialized experience and knowledge base. In order for this advice to be positively received, it is imperative that the airline’s security experts employ better communication strategies geared to increase trust and build a better rapport with the aircrews.

The most important requirement to deliver effective risk communication is credibility (Heldring, 2004). Delivering a consistent message is paramount when establishing credibility with aircrews. To further improve credibility, AVSEC experts should be specific when providing security information to aircrew. Non-specific risk communications increase anxiety (2004) and hurt credibility. Providing the most specific information possible without compromising operational security and delivering it with empathy should be the goal of the AVSEC expert.

AVSEC experts should also spend considerable time building a rapport with their aircrew customers, obtaining a greater appreciation for what other demands are put on them when performing those roles. AVSEC experts should periodically ride jumpseat on some of the airline’s more security risk-prone routes to observe actual scenarios aircrew encounter. These types of “ride along” programmes have been shown to be effective in bridging the gap between police officers and emergency dispatchers in the law enforcement profession who rely on each other, but normally do not share the same work environment.

Finally, whilst aircrew in this study seem to have at least some confidence in their training, there is a clear need for better security risk assessment training. Airlines should ensure they shape their security education and training programmes with the findings from this study in mind. Security risk assessment training should be standardized amongst commercial aircrew’s initial training programmes. Aircraft captains, as decision makers, should also be required to attend a more rigorous security risk assessment training course. This will help them know what questions to ask the rest of the crew when facing a potential security threat to ensure more accurate information is passed on to the AVSEC experts they would consult. This should lead to better risk assessment, better decision-making, improved passenger and crew safety and increased passenger confidence in the aviation security system.

Another part of the training programme should be scenario development. Aircrew’s participation in realistic scenarios based on actual onboard incidents as well as ones created from potential risks discovered with horizon scanning should be a requirement in annual recurrent training. AVSEC experts should consider factors that affect risk perception when developing these scenarios.

6. Conclusion

More research is needed to determine what methods are more effective in bridging the gap between aircrew and aviation security experts when it comes to assessing onboard security events. The additional research can help airlines respond to the increasing amount of unruly passenger events as well as the more traditional security events. Research into various communication strategies and training programmes has not been conducted in this area and present an excellent opportunity for airlines and researchers.

On behalf of all authors, the corresponding author states that there is no conflict of interest.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. The work did not receive any funding and was part of first author’s Master’s dissertation.

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